

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P363141

Luminaire Tested: NVN-SA5C-722-U-T3-HSS

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P363141  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-15)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA5C-722-U-T3-HSS  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(5) 70 CRI, 2200K, 1050mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 19143 lumens  
Efficiency: N/A  
Efficacy: 68.6 lumens/watt  
Luminous Opening: Rectangular (W 1' x L: 1.5' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B2 - U0 - G3

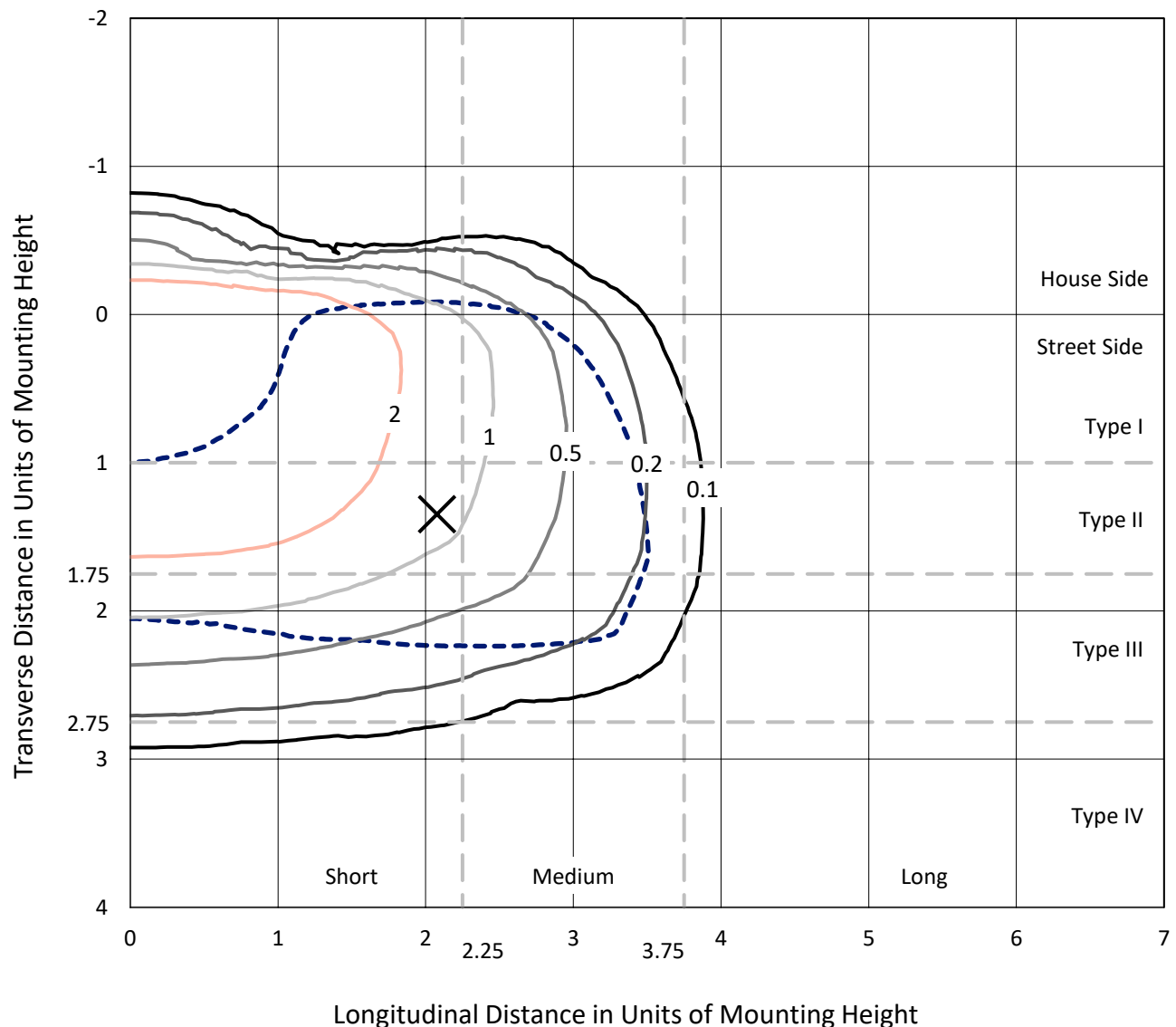
Input Watts (W): 279  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



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## Iso-Footcandle Lines of Horizontal Illumination

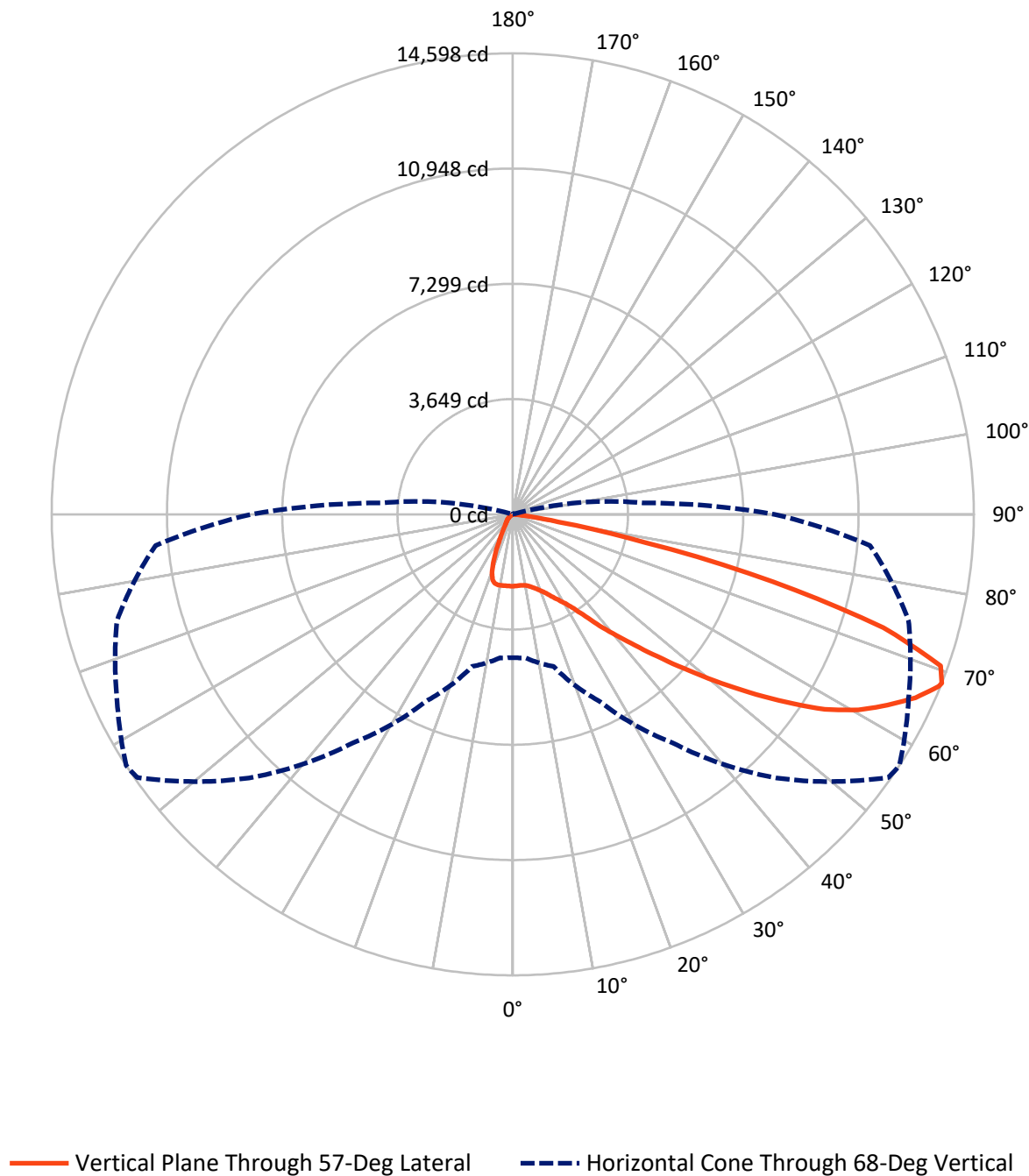
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 4.7 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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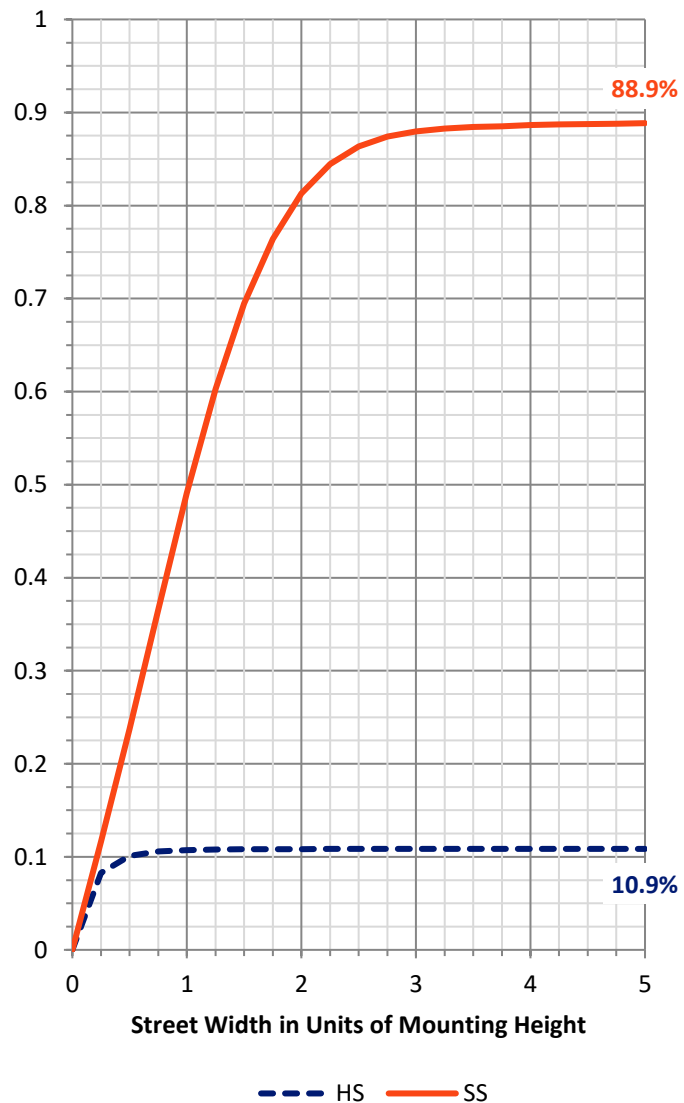
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2099.1   | 0.0    | 2099.1  |
|                    | % Fixture | 11.0     | 0.0    | 11.0    |
| <b>Street Side</b> | Lumens    | 17043.9  | 0.0    | 17043.9 |
|                    | % Fixture | 89.0     | 0.0    | 89.0    |
| <b>Total</b>       | Lumens    | 19143.0  | 0.0    | 19143.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 212.9   | 1.1       |
| 10°-20°   | 589.9   | 3.1       |
| 20°-30°   | 1017.6  | 5.3       |
| 30°-40°   | 1756.4  | 9.2       |
| 40°-50°   | 3004.3  | 15.7      |
| 50°-60°   | 4806.7  | 25.1      |
| 60°-70°   | 5553.6  | 29.0      |
| 70°-80°   | 2122.1  | 11.1      |
| 80°-90°   | 79.6    | 0.4       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 19143.0 | 100.0     |
| 0°-180°   | 19143.0 | 100.0     |

**Coefficient of Utilization**



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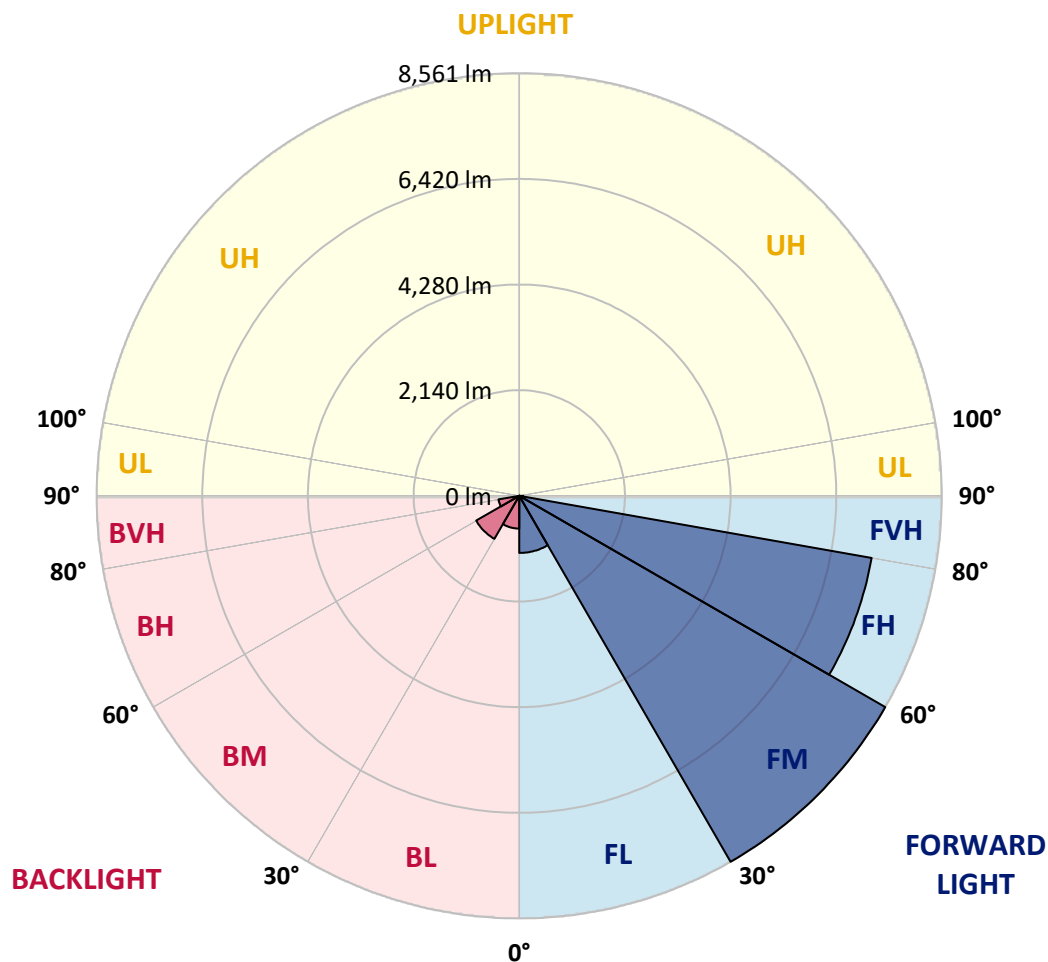
CATALOG NUMBER: NVN-SA5C-722-U-T3-HSS

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1157.0 | 6.0       |                         |      |         |
| FM   | (30°-60°)   | 8560.6 | 44.7      |                         |      |         |
| FH   | (60°-80°)   | 7248.2 | 37.9      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 78.1   | 0.4       |                         |      | G1/100  |
| BL   | (0°-30°)    | 663.4  | 3.5       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1006.8 | 5.3       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 427.5  | 2.2       | B1/500                  |      | G1/500  |
| BVH  | (80°-90°)   | 1.5    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B2-U0-G3**

Type III Short





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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°     | 35°     | 45°     | 55°     | 57°     | 65°     | 75°     | 85°     |
|-------|--------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 2274.7 | 2274.7 | 2274.7 | 2274.7  | 2274.7  | 2274.7  | 2274.7  | 2274.7  | 2274.7  | 2274.7  | 2274.7  |
| 2.5°  | 2221.3 | 2231.2 | 2238.5 | 2243.0  | 2248.4  | 2260.2  | 2263.8  | 2269.3  | 2272.0  | 2272.0  | 2278.3  |
| 5°    | 2133.5 | 2144.3 | 2159.7 | 2172.4  | 2197.8  | 2230.3  | 2253.9  | 2262.9  | 2279.2  | 2293.7  | 2301.8  |
| 7.5°  | 2052.0 | 2064.7 | 2082.8 | 2112.7  | 2156.1  | 2208.6  | 2257.5  | 2270.2  | 2301.8  | 2332.6  | 2348.0  |
| 10°   | 1999.5 | 2009.5 | 2033.0 | 2075.6  | 2132.6  | 2205.9  | 2274.7  | 2290.1  | 2344.4  | 2396.0  | 2425.0  |
| 12.5° | 1981.4 | 1990.5 | 2014.9 | 2062.9  | 2133.5  | 2219.5  | 2314.5  | 2337.1  | 2416.8  | 2491.9  | 2532.7  |
| 15°   | 2007.7 | 2009.5 | 2035.7 | 2081.0  | 2150.7  | 2253.0  | 2380.6  | 2407.8  | 2508.2  | 2606.0  | 2656.7  |
| 17.5° | 2109.0 | 2100.9 | 2114.5 | 2134.4  | 2189.6  | 2297.3  | 2450.3  | 2491.0  | 2625.0  | 2740.0  | 2787.9  |
| 20°   | 2362.5 | 2362.5 | 2331.7 | 2277.4  | 2278.3  | 2366.1  | 2544.4  | 2590.6  | 2754.4  | 2887.5  | 2930.9  |
| 22.5° | 2796.1 | 2787.9 | 2726.4 | 2593.3  | 2471.1  | 2484.7  | 2659.4  | 2719.1  | 2910.1  | 3052.2  | 3066.7  |
| 25°   | 3317.4 | 3307.5 | 3212.4 | 3025.1  | 2813.3  | 2676.6  | 2815.1  | 2883.9  | 3095.7  | 3221.5  | 3191.6  |
| 27.5° | 3869.6 | 3861.5 | 3767.3 | 3534.7  | 3233.3  | 2982.5  | 3000.6  | 3065.8  | 3284.9  | 3408.9  | 3313.8  |
| 30°   | 4404.6 | 4407.3 | 4314.0 | 4075.1  | 3733.8  | 3372.7  | 3236.0  | 3274.0  | 3468.6  | 3594.4  | 3458.7  |
| 32.5° | 4913.3 | 4916.9 | 4836.3 | 4569.3  | 4250.7  | 3826.2  | 3561.8  | 3551.9  | 3682.2  | 3806.2  | 3650.6  |
| 35°   | 5366.8 | 5375.8 | 5320.6 | 5113.3  | 4775.7  | 4331.2  | 3984.6  | 3961.0  | 3985.5  | 4125.8  | 3944.7  |
| 37.5° | 5804.0 | 5809.4 | 5767.7 | 5593.0  | 5310.6  | 4886.1  | 4518.6  | 4485.1  | 4432.6  | 4540.3  | 4333.1  |
| 40°   | 6282.8 | 6269.2 | 6221.2 | 6062.8  | 5820.2  | 5498.9  | 5092.5  | 5034.6  | 4943.1  | 5039.1  | 4843.6  |
| 42.5° | 6728.1 | 6712.7 | 6720.9 | 6541.7  | 6337.1  | 6128.9  | 5761.4  | 5661.8  | 5608.4  | 5718.9  | 5469.9  |
| 45°   | 7284.8 | 7276.7 | 7303.8 | 7148.1  | 6982.5  | 6831.3  | 6528.1  | 6419.5  | 6395.9  | 6525.4  | 6227.6  |
| 47.5° | 7834.2 | 7854.2 | 7938.3 | 7872.3  | 7805.3  | 7672.2  | 7340.0  | 7291.1  | 7305.6  | 7462.2  | 7026.8  |
| 50°   | 8292.3 | 8315.8 | 8546.6 | 8622.7  | 8719.5  | 8641.7  | 8308.6  | 8278.7  | 8335.7  | 8476.9  | 7886.7  |
| 52.5° | 8623.6 | 8671.5 | 8958.5 | 9308.8  | 9661.8  | 9714.3  | 9382.1  | 9354.9  | 9431.9  | 9453.6  | 8551.1  |
| 55°   | 8853.5 | 8896.0 | 9221.0 | 9861.8  | 10580.5 | 10806.8 | 10600.4 | 10495.5 | 10481.0 | 10266.4 | 9249.9  |
| 57.5° | 8894.2 | 8889.7 | 9356.7 | 10219.4 | 11301.1 | 11884.9 | 11754.5 | 11651.4 | 11354.5 | 11017.7 | 10051.0 |
| 60°   | 8664.3 | 8690.5 | 9232.7 | 10343.4 | 11753.6 | 12700.4 | 12710.4 | 12576.4 | 12113.9 | 11748.2 | 10827.6 |
| 62.5° | 7956.4 | 8063.3 | 8610.9 | 10018.4 | 11748.2 | 13029.0 | 13411.0 | 13308.7 | 12755.7 | 12346.5 | 11615.1 |
| 65°   | 6808.7 | 6846.7 | 7369.0 | 8905.1  | 10954.4 | 12891.4 | 14041.9 | 14003.9 | 13334.1 | 12927.6 | 12019.8 |
| 67.5° | 4972.1 | 4889.7 | 5438.3 | 7012.4  | 9274.4  | 12089.5 | 14494.5 | 14542.5 | 13780.3 | 13047.1 | 11588.9 |
| 68°   | 4537.6 | 4562.1 | 4989.3 | 6544.4  | 8834.5  | 11806.1 | 14524.4 | 14597.7 | 13824.7 | 12969.3 | 11353.6 |
| 70°   | 2704.6 | 2751.7 | 3132.8 | 4505.9  | 6720.9  | 10203.1 | 14202.1 | 14369.6 | 13560.4 | 12166.4 | 9820.2  |
| 72.5° | 690.6  | 746.8  | 1107.0 | 2016.7  | 3838.8  | 7188.9  | 11989.0 | 12272.3 | 11773.6 | 9870.0  | 6629.5  |
| 75°   | 284.2  | 298.7  | 395.6  | 664.4   | 1430.2  | 3238.7  | 7902.1  | 8508.6  | 8161.9  | 5909.0  | 2996.1  |
| 77.5° | 196.4  | 206.4  | 254.4  | 368.4   | 619.1   | 1098.0  | 3874.1  | 4312.2  | 3885.0  | 2016.7  | 653.5   |
| 80°   | 141.2  | 149.4  | 181.9  | 245.3   | 355.7   | 391.9   | 1262.7  | 1460.0  | 1159.5  | 442.6   | 162.0   |
| 82.5° | 84.2   | 90.5   | 135.8  | 174.7   | 216.3   | 187.4   | 314.1   | 356.6   | 335.8   | 220.0   | 72.4    |
| 85°   | 41.6   | 48.9   | 91.4   | 124.9   | 116.8   | 78.7    | 95.9    | 106.8   | 132.2   | 134.0   | 38.9    |
| 87.5° | 2.7    | 5.4    | 53.4   | 75.1    | 32.6    | 18.1    | 28.1    | 34.4    | 47.1    | 66.1    | 16.3    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



REPORT NUMBER: P363141

CATALOG NUMBER: NVN-SA5C-722-U-T3-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2274.7 | 2274.7 | 2274.7 | 2274.7 | 2274.7 | 2274.7 | 2274.7 | 2274.7 | 2274.7 | 2274.7 | 2274.7 |
| 2.5°  | 2281.0 | 2281.9 | 2275.6 | 2272.9 | 2274.7 | 2263.8 | 2259.3 | 2261.1 | 2261.1 | 2263.8 | 2259.3 |
| 5°    | 2303.7 | 2303.7 | 2292.8 | 2278.3 | 2270.2 | 2249.3 | 2235.8 | 2232.2 | 2229.4 | 2227.6 | 2224.0 |
| 7.5°  | 2352.5 | 2347.1 | 2328.1 | 2296.4 | 2269.3 | 2224.0 | 2189.6 | 2171.5 | 2162.5 | 2158.8 | 2156.1 |
| 10°   | 2431.3 | 2421.3 | 2389.6 | 2330.8 | 2268.4 | 2187.8 | 2112.7 | 2059.3 | 2014.9 | 1996.8 | 1985.9 |
| 12.5° | 2537.2 | 2522.7 | 2469.3 | 2371.5 | 2262.0 | 2113.6 | 1950.6 | 1794.0 | 1648.3 | 1588.6 | 1558.7 |
| 15°   | 2659.4 | 2638.6 | 2554.4 | 2405.9 | 2224.9 | 1946.1 | 1592.2 | 1317.9 | 1116.1 | 1040.0 | 1007.5 |
| 17.5° | 2783.4 | 2756.2 | 2628.6 | 2427.7 | 2113.6 | 1599.4 | 1117.0 | 843.6  | 708.7  | 672.5  | 659.9  |
| 20°   | 2908.3 | 2868.5 | 2692.9 | 2411.4 | 1861.9 | 1153.2 | 736.8  | 616.4  | 577.5  | 566.6  | 563.0  |
| 22.5° | 3026.9 | 2965.3 | 2750.8 | 2348.0 | 1474.5 | 773.9  | 582.9  | 544.9  | 532.2  | 525.9  | 524.1  |
| 25°   | 3130.1 | 3044.1 | 2801.5 | 2152.5 | 1043.7 | 584.7  | 525.0  | 512.3  | 496.0  | 484.3  | 485.2  |
| 27.5° | 3226.9 | 3122.8 | 2832.3 | 1830.3 | 696.1  | 499.7  | 486.1  | 468.9  | 439.0  | 421.8  | 421.8  |
| 30°   | 3343.7 | 3227.8 | 2854.9 | 1408.4 | 512.3  | 441.7  | 430.9  | 404.6  | 363.9  | 341.2  | 341.2  |
| 32.5° | 3519.3 | 3387.1 | 2840.4 | 988.4  | 424.5  | 388.3  | 363.0  | 326.8  | 282.4  | 260.7  | 259.8  |
| 35°   | 3788.1 | 3633.4 | 2737.2 | 648.1  | 374.7  | 337.6  | 296.9  | 252.5  | 213.6  | 195.5  | 194.6  |
| 37.5° | 4150.2 | 3962.8 | 2505.5 | 463.4  | 335.8  | 290.6  | 241.7  | 192.8  | 163.8  | 152.1  | 151.2  |
| 40°   | 4620.0 | 4345.7 | 2174.2 | 375.6  | 299.6  | 245.3  | 186.5  | 149.4  | 129.4  | 120.4  | 121.3  |
| 42.5° | 5183.9 | 4755.8 | 1776.8 | 324.1  | 264.3  | 201.9  | 145.7  | 117.7  | 105.0  | 98.7   | 96.9   |
| 45°   | 5810.3 | 5160.4 | 1360.5 | 288.7  | 229.0  | 162.9  | 114.1  | 93.2   | 83.3   | 79.7   | 79.7   |
| 47.5° | 6499.1 | 5554.1 | 995.7  | 258.0  | 191.0  | 125.8  | 91.4   | 76.0   | 67.9   | 65.2   | 64.3   |
| 50°   | 7124.6 | 5827.5 | 717.8  | 225.4  | 156.6  | 99.6   | 74.2   | 63.4   | 57.9   | 54.3   | 54.3   |
| 52.5° | 7646.0 | 5913.5 | 528.6  | 190.1  | 126.7  | 79.7   | 61.6   | 54.3   | 48.9   | 46.2   | 46.2   |
| 55°   | 8104.9 | 5878.2 | 392.8  | 156.6  | 102.3  | 65.2   | 52.5   | 46.2   | 41.6   | 38.9   | 38.9   |
| 57.5° | 8544.8 | 5764.1 | 293.3  | 127.6  | 82.4   | 52.5   | 44.4   | 38.9   | 34.4   | 32.6   | 32.6   |
| 60°   | 8904.2 | 5574.0 | 218.1  | 103.2  | 66.1   | 42.5   | 37.1   | 31.7   | 28.1   | 25.3   | 25.3   |
| 62.5° | 9195.6 | 5364.0 | 160.2  | 85.1   | 52.5   | 33.5   | 29.0   | 26.2   | 20.8   | 18.1   | 18.1   |
| 65°   | 9197.4 | 5015.5 | 120.4  | 70.6   | 40.7   | 26.2   | 21.7   | 20.8   | 13.6   | 10.9   | 10.0   |
| 67.5° | 8532.1 | 4324.0 | 92.3   | 60.6   | 31.7   | 19.9   | 16.3   | 17.2   | 7.2    | 4.5    | 3.6    |
| 68°   | 8290.5 | 4148.4 | 86.9   | 59.7   | 29.9   | 19.0   | 15.4   | 17.2   | 6.3    | 3.6    | 2.7    |
| 70°   | 6989.7 | 3300.3 | 69.7   | 57.9   | 26.2   | 14.5   | 12.7   | 17.2   | 5.4    | 2.7    | 1.8    |
| 72.5° | 4470.6 | 1915.3 | 51.6   | 46.2   | 19.9   | 10.9   | 8.1    | 15.4   | 5.4    | 1.8    | 0.9    |
| 75°   | 1902.7 | 593.8  | 35.3   | 32.6   | 11.8   | 8.1    | 5.4    | 10.0   | 3.6    | 0.9    | 0.0    |
| 77.5° | 401.0  | 134.0  | 20.8   | 19.9   | 8.1    | 5.4    | 3.6    | 2.7    | 0.9    | 0.0    | 0.0    |
| 80°   | 103.2  | 38.9   | 10.9   | 10.0   | 4.5    | 2.7    | 1.8    | 0.0    | 0.0    | 0.0    | 0.0    |
| 82.5° | 32.6   | 15.4   | 6.3    | 4.5    | 1.8    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 16.3   | 9.1    | 3.6    | 1.8    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 9.1    | 2.7    | 0.9    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-10-R4

Test Date: 10/25/2019

Luminaire Tested: SA1C-722-U-5WQ

Data in this report applies to families of products SA1C-722-U-5WQ.

### Test Information

Test Method: LM-79-2008 Report  
 Number: SP1-1908-441-10-R4  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/28/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: MCGRAW-EDISON  
 Catalog Number: **SA1C-722-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |         |           |      |      |       |
|---------------------------|---------|-----------|------|------|-------|
| CCT (K):                  | 2237    | CRI (Ra): | 72.0 |      |       |
| CIE u':                   | 0.2876  | R1:       | 68.9 | R9:  | -17.4 |
| CIE v':                   | 0.5346  | R2:       | 83.0 | R10: | 61.3  |
| Duv:                      | -0.0006 | R3:       | 95.2 | R11: | 59.8  |
| CIE x:                    | 0.5005  | R4:       | 66.2 | R12: | 50.5  |
| CIE y:                    | 0.4134  | R5:       | 65.9 | R13: | 71.1  |
| CIE z:                    | 0.0860  | R6:       | 76.3 | R14: | 96.9  |
| Peak Wavelength (nm):     | 603     | R7:       | 76.7 |      |       |
| Dominant Wavelength (nm): | 587     | R8:       | 43.8 |      |       |
| Purity:                   | 74.5    |           |      |      |       |
| Rf:                       | 69.8    |           |      |      |       |
| Rg:                       | 99.2    |           |      |      |       |



### Test Conditions

Stabilization Time: 71M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 24.7/41%  
 Sphere Temperature (°C): 25.6

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| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

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CIE 1931 Chromaticity Diagram



CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles



Point lies inside the ANSI 2200K 4-step quadrangle

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**Photopic Flux vs. Wavelength**



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Scotopic Flux vs. Wavelength**



**Scotopic Lumens: 4696.9**

**S/P: 0.85**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 1470.8 M/P: 0.27**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 1768             | NR               | 490       | 5206             | NR               | 620       | 130919           | NR               | 750       | 8553             | NR               | 880       | 2713             | NR               |
| 365       | 1569             | NR               | 495       | 7286             | NR               | 625       | 125335           | NR               | 755       | 7696             | NR               | 885       | 2316             | NR               |
| 370       | 1594             | NR               | 500       | 10654            | NR               | 630       | 118388           | NR               | 760       | 6978             | NR               | 890       | 2539             | NR               |
| 375       | 1744             | NR               | 505       | 15189            | NR               | 635       | 111855           | NR               | 765       | 6377             | NR               | 895       | 1933             | NR               |
| 380       | 1659             | NR               | 510       | 20541            | NR               | 640       | 104062           | NR               | 770       | 5600             | NR               | 900       | 2216             | NR               |
| 385       | 1504             | NR               | 515       | 26492            | NR               | 645       | 96365            | NR               | 775       | 5000             | NR               | 905       | 2067             | NR               |
| 390       | 1541             | NR               | 520       | 32294            | NR               | 650       | 88651            | NR               | 780       | 4709             | NR               | 910       | 1959             | NR               |
| 395       | 1355             | NR               | 525       | 38123            | NR               | 655       | 81152            | NR               | 785       | 4305             | NR               | 915       | 1874             | NR               |
| 400       | 1243             | NR               | 530       | 43232            | NR               | 660       | 73523            | NR               | 790       | 4040             | NR               | 920       | 1484             | NR               |
| 405       | 1417             | NR               | 535       | 48012            | NR               | 665       | 66123            | NR               | 795       | 3642             | NR               | 925       | 1914             | NR               |
| 410       | 2147             | NR               | 540       | 52623            | NR               | 670       | 58677            | NR               | 800       | 3594             | NR               | 930       | 1948             | NR               |
| 415       | 3837             | NR               | 545       | 57516            | NR               | 675       | 52349            | NR               | 805       | 3190             | NR               | 935       | 2079             | NR               |
| 420       | 7159             | NR               | 550       | 62613            | NR               | 680       | 46159            | NR               | 810       | 3241             | NR               | 940       | 2263             | NR               |
| 425       | 12599            | NR               | 555       | 68554            | NR               | 685       | 40525            | NR               | 815       | 2732             | NR               | 945       | 1688             | NR               |
| 430       | 19019            | NR               | 560       | 75325            | NR               | 690       | 35615            | NR               | 820       | 2612             | NR               | 950       | 1560             | NR               |
| 435       | 24875            | NR               | 565       | 82533            | NR               | 695       | 31158            | NR               | 825       | 2966             | NR               | 955       | 2826             | NR               |
| 440       | 29103            | NR               | 570       | 90909            | NR               | 700       | 27409            | NR               | 830       | 2574             | NR               | 960       | 1477             | NR               |
| 445       | 29901            | NR               | 575       | 99621            | NR               | 705       | 24204            | NR               | 835       | 2633             | NR               | 965       | 1568             | NR               |
| 450       | 24862            | NR               | 580       | 108484           | NR               | 710       | 21558            | NR               | 840       | 2526             | NR               | 970       | 2030             | NR               |
| 455       | 15942            | NR               | 585       | 116679           | NR               | 715       | 19222            | NR               | 845       | 2631             | NR               | 975       | 1986             | NR               |
| 460       | 9916             | NR               | 590       | 123752           | NR               | 720       | 17310            | NR               | 850       | 2079             | NR               | 980       | 2540             | NR               |
| 465       | 7051             | NR               | 595       | 129324           | NR               | 725       | 15280            | NR               | 855       | 2309             | NR               | 985       | 1139             | NR               |
| 470       | 5227             | NR               | 600       | 134082           | NR               | 730       | 13282            | NR               | 860       | 2528             | NR               | 990       | 2018             | NR               |
| 475       | 4257             | NR               | 605       | 135698           | NR               | 735       | 11753            | NR               | 865       | 2121             | NR               | 995       | 3445             | NR               |
| 480       | 4052             | NR               | 610       | 135144           | NR               | 740       | 10654            | NR               | 870       | 2751             | NR               | 1000      | 3704             | NR               |
| 485       | 4298             | NR               | 615       | 134180           | NR               | 745       | 9451             | NR               | 875       | 2317             | NR               |           |                  |                  |

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**Summary**

$R_f = 69.8$   
 $R_g = 99.2$   
 CIE  $R_a = 72.0$   
 $R_g = -17.4$



**Color Vector Graphics**



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**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 87 | CES26 = 56 | CES51 = 74 | CES76 = 56 |
| CES02 = 65 | CES27 = 76 | CES52 = 76 | CES77 = 81 |
| CES03 = 32 | CES28 = 83 | CES53 = 65 | CES78 = 63 |
| CES04 = 72 | CES29 = 46 | CES54 = 78 | CES79 = 84 |
| CES05 = 52 | CES30 = 48 | CES55 = 75 | CES80 = 84 |
| CES06 = 52 | CES31 = 51 | CES56 = 65 | CES81 = 63 |
| CES07 = 44 | CES32 = 51 | CES57 = 62 | CES82 = 92 |
| CES08 = 42 | CES33 = 53 | CES58 = 66 | CES83 = 83 |
| CES09 = 29 | CES34 = 70 | CES59 = 84 | CES84 = 92 |
| CES10 = 78 | CES35 = 85 | CES60 = 90 | CES85 = 81 |
| CES11 = 61 | CES36 = 78 | CES61 = 84 | CES86 = 56 |
| CES12 = 68 | CES37 = 80 | CES62 = 70 | CES87 = 78 |
| CES13 = 45 | CES38 = 53 | CES63 = 68 | CES88 = 72 |
| CES14 = 75 | CES39 = 90 | CES64 = 69 | CES89 = 62 |
| CES15 = 72 | CES40 = 84 | CES65 = 67 | CES90 = 67 |
| CES16 = 49 | CES41 = 75 | CES66 = 64 | CES91 = 90 |
| CES17 = 51 | CES42 = 79 | CES67 = 63 | CES92 = 67 |
| CES18 = 57 | CES43 = 64 | CES68 = 69 | CES93 = 79 |
| CES19 = 74 | CES44 = 98 | CES69 = 80 | CES94 = 52 |
| CES20 = 68 | CES45 = 73 | CES70 = 63 | CES95 = 76 |
| CES21 = 89 | CES46 = 67 | CES71 = 63 | CES96 = 78 |
| CES22 = 81 | CES47 = 60 | CES72 = 87 | CES97 = 77 |
| CES23 = 92 | CES48 = 48 | CES73 = 56 | CES98 = 71 |
| CES24 = 92 | CES49 = 64 | CES74 = 87 | CES99 = 65 |
| CES25 = 74 | CES50 = 74 | CES75 = 66 |            |



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Color Rendition by Hue-Angle Bin



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**Measure Comparisons**



(END OF REPORT)